

CLAIMS

What is claimed is:

- 1 A combiner for selecting digitized programs and for combining the selected programs to create a combined signal for distribution to program subscribers, for use in a television program delivery system headend wherein the combiner receives digital video signals containing a plurality of digitized programs and receives information on programs to be selected, the combiner comprising:
- 5 means for receiving the information on programs to be selected for distribution to the program subscribers;
- 10 processor means for sending instructions comprising:
- means for determining identities of the plurality of digitized programs to be selected using the received information, and
- 15 means for generating instructions on the identities of the plurality of digitized programs to be selected;
- means, connected to the processor means, for selecting any of the plurality of digitized programs comprising:
- 20 means for demultiplexing the received digital video signals into component parts each of the component parts containing one of the plurality of digitized programs; and
- 25 means for communicating identified digitized programs using the program identities received in instructions from the processor;
- means for combining the communicated programs into a combined signal comprising reception means for receiving the communicated programs; and
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- means for distributing the combined signal to the subscribers.
2. The combiner of claim 1 wherein the program subscribers are distributed digitized programs and wherein the distributing means comprises:
- digital modulator means for modulating the combined signal so that the digitized programs are transmitted to the program subscribers; and
- a concatenated cable system for transporting the digitally modulated signal with digitized programs to the program subscriber;
3. The combiner of claim 1 capable of producing analog programs wherein the combining means further comprises a digital-to-analog converter for converting the communicated programs into the analog programs.
4. The combiner of claim 3 wherein the program subscribers are distributed the analog programs, and wherein the combining means further comprises analog modulators for modulating the analog programs into the combined signal for distribution to subscribers.
- 25 5. The combiner of claim 1 wherein analog video and audio programs are received, digitized and combined with the digitized programs, the combiner further comprising:  
digital encoder means for digitizing analog video and audio into local digitized programs; and

means for communicating the local digitized programs to the combining means.

5       6. The combiner of claim 1 wherein analog video and audio programs are received, digitized and combined with the digitized programs, the combiner further comprising:

a digital encoder for digitizing the analog video and audio into local digitized programs; and

10      wherein the selecting means further comprises:

means for accepting the local digitized programs from the digital encoder;

means for identifying the local digitized program for communication to the combining means by the communicating means.

15      7. The combiner of claim 1 wherein analog programs are distributed with the combined signal using a first carrier frequency and a second carrier frequency, the combiner further comprising:

20      means for receiving the analog programs to be distributed with the combined signal; and

wherein the distributing means comprises:

an analog modulator for modulating the received analog programs onto the first carrier frequency; and

25      a digital modulator for modulating the combined signal onto the second carrier frequency.

30      8. The combiner of claim 1 wherein the digitized programs are expressed in video data format having video data, the combiner further comprising:

means for error correcting the video data of the digitized programs.

5 9. The combiner of claim 1 wherein the digitized programs are received encrypted using one or more methods of encryption, the combiner further comprising:

decrypting means for removing one of the methods of encryption from the digitized programs prior to the combined signal distribution to subscribers.

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10. The combiner of claim 1 further comprising:

means for encrypting the identified programs so that only authorized subscribers can decrypt the programs after distribution.

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11. The combiner of claim 1 wherein the information on digitized programs to be selected is received with the digital video signals, and wherein the means for receiving information on the digitized programs comprises:

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an information data demultiplexer for extracting a data signal containing the information on digitized programs to be selected; and

means for transferring the data signal from the information data demultiplexer to the processor.

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12. The combiner of claim 1 wherein the means for receiving the information on digitized programs to be selected comprises:

terminal means for manually entering information on digitized programs to be selected; and

means for forwarding the entered information on digitized programs from the terminal to the processor.

13. The combiner of claim 1 wherein a data signal containing the information on digitized programs to be selected is transmitted from a remote site and wherein the means for receiving the information on programs to be selected comprises:

5                   modem means for acquiring the data signal containing the information on digitized programs to be selected; and  
10                  means for delivering the data signal to the processor.

14. The combiner of claim 1 wherein the communicating means further comprises:

15                  means for obtaining the digitized programs from the demultiplexing means;

                      means for accepting the instructions from the processor;  
                      configuration means for interpreting the instructions received from the processor and providing program identifying data; and

20                  logic means for receiving program identifying data and enabling the identified digitized programs to be communicated to the combining means.

25                  15. The combiner of claim 1 wherein the combining means further comprises a plurality of first-in-first-out queuing means for temporarily storing portions of the communicated programs; and wherein the selecting means comprises a control means for sending control information to the plurality of first-in-first-out queuing means.

16. The combiner of claim 1 wherein the combining means comprises a plurality of output gates controlled by the processor for output of communicated programs.
- 5 17. The combiner of claim 1 wherein the digitized programs are expressed by a series of video data packets and wherein the communicating means communicates video data packets to the combining means, and wherein the combining means further comprises:
- 10       serializer means for placing the video data packets in a serial order.
- 15 18. The combiner of claim 17 wherein the processor further comprises:
- means for prioritizing the communicated video data packets by importance; and
- means for controlling the order of the communicated video data packet flow in the combiner using the prioritization established by the prioritizing means.
- 20 19. The combiner of claim 17 wherein communicated video data packets are discarded by the combiner to limit disruption of video reception by the subscribers, the processor further comprising:
- 25       means for determining which communicated video data packets to be discarded.
- 30 20. A method for selecting and combining digitized programs to create a combined signal for distribution to program subscribers, for use in a television program delivery system

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- headend wherein the combiner receives digital video signals containing a plurality of digitized programs and receives information on programs to be selected, comprising the steps of:
- receiving the information on programs to be selected for distribution to the program subscribers;
- sending instructions comprising the steps of:
- determining identities of digitized programs to be selected using the received information; and
- generating instructions on the identities of the digitized programs to be selected;
- selecting digitized programs comprising the steps of:
- demultiplexing the received digital video signals into component parts each of the component parts containing one of the plurality of digitized programs; and
- communicating identified digitized programs using the program identities received in instructions from the processing step;
- combining the communicated programs into a combined signal comprising receiving the communicated programs; and
- distributing the combined signal to the subscribers.
21. A cable headend for cable television program delivery systems which deliver a plurality of program signals each containing a plurality of digital video programs expressed in digital format comprising:
- means for receiving a plurality of program signals each containing a plurality of digital video programs expressed in digital format;
- demodulator means, connected to the receiving means, for demodulating the plurality of program signals;

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- demultiplexer means, connected to the demodulator, for demultiplexing the demodulated program signals into the plurality of digital video programs;
- means for selecting among the plurality of digital video programs;
- means, coupled to the selecting means, for combining the selected video programs to form a combined signal;
- means for modulating the combined signal for distribution to cable subscribers; and
- transmitter means for transmitting the modulated signal to one or more concatenated cable systems.
22. The cable headend of claim 21, wherein the cable headend receives analog programs from a remote source, and wherein the means for combining the selected video programs further comprises a means for combining analog program signals with the selected video programs, the cable headend further comprising:
- means for receiving one or more analog program signals; and
- means for choosing one or more analog program signals to be combined with the selected digitized video signals.
23. The cable headend of claim 21, wherein the means for receiving a plurality of program signals is also capable of receiving analog program signals, the cable headend further comprising:
- means for converting analog program signals into digital video signals comprising:

means for digitizing and compressing the analog program signal.

24. The cable headend of claim 21 wherein the means for combining further comprises:

5 a plurality of storage means for temporarily storing the selected video program before combining the selected video programs wherein each storage means temporarily stores a portion of one selected video program at a time; and

10 means for accessing each of the plurality of storage means by switching from one storage means to another storage means for assisting in combining stored portions of video program into the combined signal.

15 25. The cable headend of claim 21 wherein the means for selecting among a plurality of digital video programs comprises:

information processing means for identifying digital video programs to be selected.

20 26. The cable headend of claim 21 wherein the digital video programs are grouped into a plurality of sets and some subscribers are not authorized to receive a first set of video programs, and

25 wherein the selecting means comprises a means for simultaneously selecting a first set of digital video programs and selecting a second set of digital video programs, and

wherein the combining means comprises means for combining the first set of selected digital video programs

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and the second set of selected video programs for distribution to cable subscribers.

27. The cable headend of claim 21 further comprising:  
means for decrypting and encrypting the video programs.

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- 15 signal into a plurality of video signals;  
means for selecting among the plurality of video signals comprising:  
a control CPU for instructing on video signals to be selected;

20 a combiner for combining selected video signals comprising:  
means for temporarily storing portions of individual video signals;  
means for assembling various stored portions of individual video signals into a combined signal;  
transmitter means for transmitting the combined signal to set-top terminals; and  
transmission media, connected to the transmitter means, to carry the transmitted signal to the set-top terminals.

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29. The headend of claim 28 wherein the transmission media comprises telephone lines.
30. A signal processor for a cable headend wherein the signal processor receives program signals and a program information data signal comprising:
- first receiving means for receiving a plurality of program signals;
- second receiving means for receiving program information;
- means for selecting among the plurality of program signals using the received program information;
- first combiner means for combining the selected program signals comprising:
- means for temporarily storing portions of the selected program signals during the first combining process;
- second combiner means for combining the program information with the combined selected program signals to generate a combined signal; and
- means for distributing the combined signal to cable subscribers.
31. A cable headend for a television program delivery system which uses a plurality of video signals and instructions, and wherein set-top terminals communicate with the cable headend, the cable headend comprising:
- a signal processor for processing a plurality of video signals comprising:
- means for receiving a plurality of video signals;

- means for selecting video signals from the plurality of video signals; and  
combiner means for combining the selected video signals for distribution to set top terminals;
- 5 a network controller for controlling the operation of the signal processor and the set-top terminals comprising:  
means for obtaining communications from the set-top terminals;  
a computer processor, connected to the obtaining means, for generating the instructions to the signal processor using the obtained communications from the set top terminal; and  
means for transferring the instructions to the signal processor to be used for selecting video signals; and
- 10 15 means for distributing the combined video signals to the set top terminals.
32. A digital cable headend for a cable television program delivery system which uses a satellite transponder to deliver video programs in digital format to subscribers on a concatenated cable system, wherein the cable headend receives local programs and information on the insertion of local programs into the delivery system, the digital cable headend comprising:
- 20 25 means for receiving transponded signals containing digital video programs;  
integrated receiver decoder means for receiving and decoding the transponded signals;  
means for demultiplexing the decoded signals into digital video programs;
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- processor means for generating a local program information signal using information on the insertion of local programs with the received digital video program signals;
- means for inserting local programs comprising:
- 5 means for obtaining local programs in digital format; and
- means for communicating with the processor to receive the generated local program information signal;
- 10 means for multiplexing the digital video programs and local programs into a combined signal;
- means for modulating the combined signal for transmission;
- means for distributing the modulated signal to subscribers on a concatenated cable system.
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33. A modular cable headend for a cable television program delivery system which receives program signals, at least one of the program signals having digitized programs, and services a plurality of set top terminals, wherein set top terminals receive processed signals from the cable headend, the modular cable headend comprising:
- a first set of signal processing equipment comprising:
- 25 means for receiving program signals for processing; and
- means for processing the program signals into a first processed signal;
- a second set of signal processing equipment comprising:
- 30 means for receiving program signals with digitized programs; and

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means for processing the digitized programs into a second processed signal;

means, connected to the first set of signal processing equipment and the second set of signal processing equipment, for adding the first processed signal to the second processed signal to produce an added signal containing more programs than either processed signal; and

means for distributing the added signal to a plurality of set top terminals.

34. The modular cable headend of claim 33 wherein some of the plurality of set top terminals are only distributed the first processed signal, the modular cable headend further comprising:

means, connected to the first set of signal processing equipment, for distributing the first processed signal to some of the plurality of set top terminals.

35. The modular cable headend of claim 33 wherein the television program delivery system uses a two groups of satellite transponders, a first group and a second group, to deliver television programs to subscribers on a concatenated cable system, and

wherein the means for receiving program signals comprises means for obtaining transponded signals from the first group of satellites transponders; and

wherein the means for receiving program signals with digitized programs comprises means for obtaining transponded signals from the second group of satellite transponders.

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36. A cable headend for a television program delivery system which uses groups of satellite transponders to deliver television programs in digital format to subscribers on a concatenated cable system, wherein the cable headend groups television programs distributed to subscribers into priority levels, the cable headend comprising:
- 5 means for receiving transponded signals containing digital video programs;
- 10 integrated receiver means for receiving the transponded signal;
- 15 means for grouping transponded signals into priority levels wherein a first group of transponded signals are priority level one and a second group of transponded signals are priority level two;
- 20 means for demultiplexing the priority level one transponded signals into priority level one digital programs and priority level two transponded signals into priority level two digital programs;
- 25 first means for selecting priority level one digital programs;
- second means for selecting priority level two digital programs; and
- means for combining selected priority level one and two digital programs for distribution to subscribers.

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